The information summarized in this Distributed Generation Interconnection Seminar for the convenience of customers is current as of October 18, 2018 and neither the slides nor related recording should be relied on. Customers are responsible for ensuring that they comply with all DG rules and regulations, including the interconnection tariff.
15 min  Welcome, Opening Remarks  Will Kern
30 min  Interconnection Process Overview  Jeff Crompton, Ariella Cohen
30 min  DG and Energy Storage Updates  Will Kern
10 min  Break
15 min  SMART  Jed Ferris
45 min  ISO-NE and the Interconnection Process  Jacques Asselin with ISO-NE
30 min  Questions
30 min  Meet and Greet with CEI Job Owners
National Grid Interconnection Process for Distributed Energy Resources
Importance of the Interconnection Process

- **Safety** of utility workers and general public
- **No adverse impact** to power quality, in terms of:
  - Islanding
  - Transient Voltage Conditions
  - Noise and Harmonics
  - Frequency
  - Voltage Level
  - Machine Reactive Capability
- **Customers cannot interconnect to the Electric Power System (EPS) without the Company’s authorization.**
- Billing implications
Simplified Review Process
Simplified Criteria

- UL Listed (1741 SA), inverter based systems with power ratings of **15kW** or less on a single phase service on a radial feed.
- UL Listed (1741 SA), inverter based systems with power ratings of **25kW** or less on a three phase service on a radial feed.

The Simplified Process does not apply for:

- non-listed inverters or other generators (induction / synchronous / asynchronous)
- aggregate generation capacity of listed inverters that exceed the above-mentioned limits
Interconnection Process Steps

- Application
  - Simplified
- Conditional Approval (to construct DG system)
- Witness Test (completion package)
- Authorization to Interconnect

https://www.nationalgridus.com/masselectric/home/energyeff/4_interconnection-process.asp
http://ngridustest/narragansett/home/energyeff/4_interconnection-process.asp
## Simplified Review Path

<table>
<thead>
<tr>
<th>Step</th>
<th>Simplified Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eligible Facilities Acknowledge Receipt</td>
<td>Listed Small Inverter</td>
</tr>
<tr>
<td>of Application (Note 2)</td>
<td>(3 days)</td>
</tr>
<tr>
<td>Review Application for Completeness</td>
<td>10 days</td>
</tr>
<tr>
<td>Complete Review of All Screens</td>
<td>15 days (20 Days) (Note 3)</td>
</tr>
<tr>
<td>Complete Supplemental Review (if needed)</td>
<td>N/A</td>
</tr>
<tr>
<td>Complete Standard Process Initial Review</td>
<td>N/A</td>
</tr>
<tr>
<td>Send Follow-on Studies</td>
<td>N/A</td>
</tr>
<tr>
<td>Cost/Agreement</td>
<td>N/A</td>
</tr>
<tr>
<td>Complete Impact Study (if needed)</td>
<td>N/A</td>
</tr>
<tr>
<td>Complete Detailed Study (if needed)</td>
<td>N/A</td>
</tr>
<tr>
<td>Send Executable Agreement (Note 4)</td>
<td>Done. The agreement is part of the application.</td>
</tr>
<tr>
<td>Total Maximum Days (Note 5)</td>
<td>25 days (30 days in the case of failure of Screen #5)</td>
</tr>
<tr>
<td>Construction Schedule</td>
<td>By Mutual Agreement</td>
</tr>
<tr>
<td>Witness Test</td>
<td>Within 10 days from receipt of the Certificate of Completion or by mutual agreement</td>
</tr>
</tbody>
</table>
Expedited Review Process
Expedited Criteria

- Single phase customers with listed single-phase inverter based systems with power ratings of $>15\text{ kW}$ on a radial feed
- Three phase customers with listed three-phase inverter based systems with power ratings of $>25\text{ kW}$ on a radial feed
- Any project that did not pass the Simplified process screens
- Non-simplified projects that do not require an impact study
- Maximum size and supplemental review is based on review of screens
Interconnection Process Steps

- Pre-Application (if over 500 kW)
- Application
  - Expedited
- Engineering Review
  - Supplemental Review
- Conditional Approval (to construct DG system)
- National Grid Construction
- Witness Test
- Authorization to Interconnect

https://www.nationalgridus.com/masselectric/home/energyeff/4_interconnection-process.asp
http://ngridustest/narragansett/home/energyeff/4_interconnection-process.asp
Expedited Review Path

<table>
<thead>
<tr>
<th>Step</th>
<th>Expedited</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eligible Facilities</td>
<td>Listed Inverter DG</td>
</tr>
<tr>
<td>Acknowledge Receipt of Application</td>
<td>(3 days)</td>
</tr>
<tr>
<td>Review Application for Completeness</td>
<td>10 days</td>
</tr>
<tr>
<td>Complete Review of All Screens</td>
<td>25 days</td>
</tr>
<tr>
<td>Complete Supplemental Review (if needed)</td>
<td>20 days or Standard Process</td>
</tr>
<tr>
<td>Send Executable Agreement</td>
<td>10 days</td>
</tr>
<tr>
<td>Total Maximum Days</td>
<td>45/65 days</td>
</tr>
<tr>
<td>Construction Schedule</td>
<td>By Mutual Agreement</td>
</tr>
<tr>
<td>Notice/ Witness Test</td>
<td>Within 10 days of receiving CoC or by mutual agreement</td>
</tr>
</tbody>
</table>

- If any screens are not passed, the Company may require a **Supplemental Review Agreement** before providing an Interconnection Service Agreement
  - Key threshold: if aggregate generation is less than 67% of minimum load on the feeder. Other screens review voltage quality, reliability and safety to reduce the potential need for impact studies.
- Relay control system must be well defined to make supplemental review easier.
Standard Review Process
Standard Criteria

- Applies to:
  - Projects that require System Impact Study (SIS)
  - Large-scale DG projects
    - Generally greater than 500 kW but project specific
  - DG projects requiring system modifications at the substation level
  - Non-listed inverters or generators other than PV:
    - Induction, Synchronous, Asynchronous
  - Most CHP systems
  - All projects that do not qualify for the Simplified or Expedited process
Interconnection Process Steps

- Pre-Application
- Application
  - Standard
- Engineering Review
  - Impact Study/Detailed Study
- Conditional Approval (to construct DG system)
- National Grid Construction
- Witness Test
- Authorization to Interconnect

https://www.nationalgridus.com/masselectric/home/energyeff/4_interconnection-process.asp
http://ngridustest/narragansett/home/energyeff/4_interconnection-process.asp
# Standard Review Path

<table>
<thead>
<tr>
<th>Eligible Facilities</th>
<th>Any DG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acknowledge Receipt of Application</td>
<td>(3 days)</td>
</tr>
<tr>
<td>Review Application for Completeness</td>
<td>10 days</td>
</tr>
<tr>
<td>Complete Standard Process Initial Review</td>
<td>20 days</td>
</tr>
<tr>
<td>Send Impact Study Agreement</td>
<td>5 days</td>
</tr>
<tr>
<td><strong>Complete Impact Study</strong></td>
<td>55 days or 60 Days Complex</td>
</tr>
<tr>
<td>Complete Detailed Study (if needed)</td>
<td>30 days or by mutual agreement</td>
</tr>
<tr>
<td>Send Executable Agreement (ISA)</td>
<td>15 days</td>
</tr>
<tr>
<td>Total Maximum Days</td>
<td>135/160 days (200 days for Standard Complex)</td>
</tr>
<tr>
<td>Construction Schedule</td>
<td>By Mutual Agreement</td>
</tr>
<tr>
<td>Witness Test</td>
<td>10 days or by mutual agreement</td>
</tr>
</tbody>
</table>

- Impact Study will determine the level of impact on EPS, other customers, other generators
- Impact and/or Detailed Study will determine System Modifications required and cost (Risk of Islanding)
- ISO-NE Notification Process and Transmission Study may be required
- Interconnection Service Agreement (ISA) provided after study completed or an Early ISA could be requested if Detailed Study is required
- If substation modifications required, Company has 60 BD for study (MDPU 1320 – pg. 50)
Summary and Recommendations

- This is a high-level overview of the interconnection process. The interconnection tariff, applicable rules, laws, regulations and MDPU orders set forth the interconnection requirements. The customer must comply with all interconnection requirements.

- Submit your interconnection application with National Grid early, during conception phase before committing to buying no matter how simple or small the DG might be.

- Large interconnection applications take longer to study
  - Proposed facilities ≥ 5MW must undergo ISO-NE Notification Process and Transmission Study
  - Adjacent facilities with aggregate ≥ 5MW may also be considered for the ISO-NE Notification Process and Transmission Study

- Company processing time frames are standard working days (Business Days) and do not include customer delays, including due to missing information, third party delays, or force majeure events

Before considering any system design changes consult your CEI project manager, including but not limited to:

- Change in system size
- Adding energy storage
- Change in generator type
- Change in inverters
DG Updates Massachusetts
MA DG Penetration-Connected & Proposed

- Gardner/Westminster/Winchendon
  - 214MW – spread over 4 substations
- Leicester/Oxford/Worcester/Auburn
  - 125MW – spread over 4 substations
- Belchertown/Granby/North Palmer
  - 208MW – spread over 3 substations
- Barre/Ware/Hardwick
  - 135MW – spread over 2 substations
- Palmer/Warren/Monson
  - 135MW – spread over 3 substations
- N. Brookfield/Spencer
  - 110MW – spread over 2 substations
- Athol/Royalston/Wendell
  - 147MW – spread over 3 substations

Total of 1.074GW on this portion of the system alone

Please Note: This information is provided as an aid to project planning and will change as projects proceed through the interconnection process.
MA High Penetration Map – Connected and Pending

Top 3 Connected and Pending Areas:
- Belchertown – 137 MW
- Winchendon – 92 MW
- Warren – 81 MW

#’s refer to MW

Please Note: The information in this MA High Penetration Heat Map is provided as an aid to project planning and will change as projects proceed through the interconnection process.
Notes on High Penetration Map

- Highlighted/referenced towns indicate that town all, or in part, has high DG penetration based on area substation DG applications.

- Map is not a guarantee of DG penetration levels in any town, and does not imply any specific conclusions to be drawn for requirements of a specific Impact Study.

- Map is provided here as a visual reference to convey the general location of the Ngrid service territory that is seeing generally high penetration levels.

- All values subject to change based on applications entering/exiting the queue.
Adding Energy Storage in the Interconnection Process
If adding an energy storage system after submitting your application, please start by informing your National Grid job owner.

The following steps will then need to be taken for the application:

- **Pre-ISA (i.e. Screening, Supplemental Review, Impact Study)**
  - National Grid considers the addition of AC and/or DC coupled storage to be a “significant” change
    - Per Section 3.5 of the Interconnection Tariff: “the Interconnection Customer will be required to submit a new Interconnection Application with associated fees and the revised project shall be placed at the end of the project queue.”
  - The new Interconnection Application will require the following to be submitted
    - Updated one-line showing the addition of the ESS
    - Updated site plan showing the addition of the ESS
    - The ESS Operating Narrative (Section 4 of the “Supporting Documentation_DER_Islanding and Fault Data Request.doc”)
    - The ESS Data Collection file (“ESS Data Collection_v9”)
    - Anti-Islanding letter for additional inverters (if applicable)
Adding Energy Storage Post-ISA

- If adding an energy storage system after **you have an executed ISA**, please start by informing your National Grid job owner.

- The following steps will then need to be taken for the ESS:
  - The addition of AC and/or DC coupled storage will require the Customer to submit a new and separate application for the ESS (Energy Storage System) with a new queue position
    - The executed ISA for the photovoltaic system remains in effect, including but not limited to the payment terms, construction milestone schedule, effective date and queue position
  - The new Interconnection Application for the ESS will require the following to be submitted in addition to all other standard application materials:
    - A new one-line showing the ESS with all other proposed/installed generators at the site
    - A new site plan showing the ESS with all other proposed/installed generators at the site
    - The ESS Operating Narrative (Section 4 of the “Supporting Documentation_DER_Islanding and Fault Data Request.doc”)
    - The ESS Data Collection file (“ESS Data Collection_v9”)
    - Anti-Islanding letter for additional inverters (if applicable)
Why does my application have to be restudied if ESS is AC-coupled and limited to the output previously studied?

- Fundamentally different technology from original project
- Control scheme evaluation
  - Equipment & operating schedule proposed
- Protection Analyses
  - Added inverters affect fault current output
- Load Flow Analyses
  - Generation no longer bounded by daytime hours
  - Any new site functionality (ramp rate control, advanced controls, etc)
Why does my application have to be restudied if ESS is DC-coupled and we’re not adding additional inverters?

- Fundamentally different technology from original project
- Load Flow Analyses
  - Generation no longer bounded by daytime hours
  - Any new site functionality (ramp rate control, advanced controls, etc)
Massachusetts SMART
The Interconnection Process – What’s changing, what won’t

Timeline

Roles of the Parties – DOER, EDC, SPA interactions with program participants and the parties

National Grid/Utilities Metering Drafts
<table>
<thead>
<tr>
<th>Date(s)</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>October 11, 2018 - October 19, 2018</td>
<td>In person SMART transition stakeholder meetings held throughout</td>
</tr>
<tr>
<td></td>
<td>Commonwealth</td>
</tr>
<tr>
<td>October 16, 2018</td>
<td>EDCs jointly file revised model tariff with DPU</td>
</tr>
<tr>
<td>October 24, 2018</td>
<td>SMART Statement of Qualification Application webinar</td>
</tr>
<tr>
<td>November 1, 2018</td>
<td>EDCs individually file SMART Factor cost recovery filings with DPU</td>
</tr>
<tr>
<td>November 26, 2018</td>
<td>SMART Application Launches at 12 PM ET / Final Eligibility Date for SREC II</td>
</tr>
<tr>
<td>November 30, 2018</td>
<td>Initial SMART application period ends at 11:59 PM ET</td>
</tr>
<tr>
<td>Approx. December 1, 2018</td>
<td>MLP solar rebate program opens and begins accepting applications</td>
</tr>
<tr>
<td>December 10, 2018</td>
<td>Documents demonstrating mechanical completion due for SREC II systems larger than 25 kW DC</td>
</tr>
<tr>
<td>February 15, 2019</td>
<td>SREC II applications systems equal to or smaller than 25 kW DC due</td>
</tr>
<tr>
<td>TBD</td>
<td>DPU order approving revised joint model tariff</td>
</tr>
<tr>
<td>TBD</td>
<td>EDCs file company specific SMART tariffs</td>
</tr>
<tr>
<td>TBD</td>
<td>DPU approves company specific SMART tariffs</td>
</tr>
<tr>
<td>TBD</td>
<td>DPU issues order on 17-146</td>
</tr>
</tbody>
</table>
The Interconnection Process

Things staying the same:

- EDC specific processes and tools for making, monitoring interconnection requests
- Interconnection timelines
- EDC teams supporting the interconnection process

The MA SMART / SPA incentive application process is designed to complement the EDC interconnection process, not replace it.
The Interconnection Process

Things that will change:

- Additional applicant-paid metering charges
- In behind the meter situations, need for a second, utility installed meter for measuring system output behind the retail meter
  - Will require customer-installed wiring, installation of a second meter socket
  - Must be adequately accessible, proximate to existing utility revenue meter
Who you gonna call?

<table>
<thead>
<tr>
<th>Issue type</th>
<th>Primary point of contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>General MA SMART Program questions</td>
<td>CLEAResult</td>
</tr>
<tr>
<td>Program / adder eligibility questions</td>
<td></td>
</tr>
<tr>
<td>Incentive application status / process questions</td>
<td>CLEAResult</td>
</tr>
<tr>
<td>Interconnection application status / process questions</td>
<td>Eversource, National Grid, Unitil</td>
</tr>
<tr>
<td>Incentive rate calculation questions</td>
<td>CLEAResult</td>
</tr>
<tr>
<td>Incentive payment questions</td>
<td>Eversource, National Grid, Unitil</td>
</tr>
</tbody>
</table>
## Key Distinction

<table>
<thead>
<tr>
<th>Behind-the-Meter</th>
<th>Standalone</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Image" /></td>
<td><img src="image2.png" alt="Image" /></td>
</tr>
<tr>
<td>System that serves on-site load other than parasitic or station load utilized to operate the unit</td>
<td>System that serves no associated on-site load other than parasitic or station load utilized to operate the unit</td>
</tr>
</tbody>
</table>

**Behind the meter systems will be compensated differently than standalone systems**
# Billing Review DRAFT

## DETAIL OF CURRENT CHARGES

### Delivery Services

<table>
<thead>
<tr>
<th>Service Period</th>
<th>No. of Days</th>
<th>Current Reading</th>
<th>Previous Reading</th>
<th>Total Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jul 7 - Aug 5</td>
<td>29</td>
<td>1200</td>
<td>500</td>
<td>700</td>
</tr>
</tbody>
</table>

**METER NUMBER 99999999**

**SERVICE PERIOD** Jun 6 - Jul 7

**NUMBER OF DAYS IN PERIOD** 29

**RATE** Residential Regular R-1

- **Customer Charge**
  - 0.06236 x 700 kWh = 43.65
- **Dist Chg**
  - 0.02084 x 700 kWh = 14.59
- **Transmission Charge**
  - 0.0005 x 700 kWh = 0.35
- **Energy Efficiency Chg**
  - 0.03056 x 700 kWh = 21.39
- **Renewable Energy Chg**
  - 0.00054 x 700 kWh = 0.38

**Total Delivery Services** $85.86

### Supply Services

**SUPPLIER** National Grid

- **Energy Charge**
  - 0.12673 x 700 kWh = 88.71

**Total Supply Services** $88.71

### MA SMART Incentive Program

<table>
<thead>
<tr>
<th>Service Period</th>
<th>No. of Days</th>
<th>Current Read</th>
<th>Previous Read</th>
<th>Total Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jul 7 - Aug 5</td>
<td>29</td>
<td>46005</td>
<td>44805</td>
<td>1200 kWh</td>
</tr>
</tbody>
</table>

**METER NUMBER 99999999**

**NEXT SCHEDULED READ DATE ON OR ABOUT** Aug 8

**SERVICE PERIOD** Jun 6 - Jul 7

**NUMBER OF DAYS IN PERIOD** 31

**RATE** Small C&I G-1

### SMART Compensation Payment

- **Total Compensation (Incl. QF pmL)** $0.28 x 1200kwh = $336.00

**Total SMART Payment** $336.00
Residential/Commercial DG Customer
SMART SOLAR Metering Notes

DEF: Distributed Energy Resource
DG: Distributed Generator (a subset of DER)
EPS: Electric Power System
IC: Interconnection Customer
PCC: Point of Common Coupling
PoC: Point of Connection
Wh: Watthour Meter (may include demand quantities of Watts and VA)

NOTES:
1. All Interval metering requires telemetry.
2. Grouped meter location and installation shall be according to National Grid’s jurisdiction applicable service and tariff requirements. See ESB 750 and ESB 756 Appendix C for the MA service jurisdiction (https://www.nationalgridus.com/ProNet/Technical-Resources/Electric-Specifications).
   - IC installs meter socket trough grouped at service location accessible for National Grid’s AMR meters (net type for load + DER and bi-directional for MA SMART DER).
   - < 60 kW applications are watthour type revenue meters and > 60 kW are interval type.
   - All kWh measured through the MA SMART meter is compensated through the MA SMART incentive rate.
3. Generator disconnect installed according to NEC and National Grid’s MDPU Interconnection Tariff.
4. Inverters shall be UL 1741 or UL 1741 SA certified for parallel operation with the utility (area EPS).
5. Where existing PCC meter is inside, the IC will upgrade their service connection to change it to outside location grouped with MA SMART Solar meter.
6. Bypass meter sockets required in accordance to ESB 750 table 7.2-1.
7. Certified Inverter-based DER Interconnections <25kW may not be required to have an additional disconnecting means in accordance with ESB 756 Appendix C.
8. The following drawings are conceptual only. It is the responsibility of the customer to adhere to all applicable codes, standards, and requirements.
9. 25 kW and below residential services do not require an additional disconnect at the Smart Solar production meter.
BTM < 60 kW
BTM < 60 kW

Residential/Commercial DG Customer
Behind the Meter MA SMART < 60 kW
(Tap Ahead of Main Service Equipment)

UTILITY – AREA EPS

INTERCONNECTION
CUSTOMER – LOCAL EPS

Tap Box cannot be associated with the meter socket

OUTSIDE
INSIDE

Main Service Equipment #1
Main Service Equipment #2 (Generator Disconnect)

FACILITY LOADS

DG

This diagram is representative of one proposal and the utility may require other configurations.

REVENUE METERS ARE BI-DIRECTIONAL, NET METER AMR TYPE AND UTILITY OWNED. METER LOCATIONS DETERMINED BY UTILITY FOR AMR ACCESS REQUIREMENTS.

See Note 9
BTM < 60 kW

RETAIL
Residential/Commercial DG Customer
Behind the Meter MA SMART < 60 kW

With AC ESS SYSTEM
UTILITY – AREA EPS

INTERCONNECTION
CUSTOMER – LOCAL EPS

OUTSIDE
INSIDE

Main Service Equipment
Generator Disconnect

FACILITY LOADS

PoC

DG Protection & Control

DG

Inverter
(charge & discharge)
Battery Storage

ESS System

UTILITY
REVENUE METER

UTILITY
REVENUE METER
MA SMART

See Note 9

1c
This diagram is representative of one proposal and the utility may require other configurations.

REVENUE METERS ARE BI-DIRECTIONAL, NET METER AMR TYPE AND UTILITY OWNED.
METER LOCATIONS DETERMINED BY UTILITY FOR AMR ACCESS REQUIREMENTS.
Residential/Commercial DG Customer
Behind the Meter MA SMART < 60 kW

With DC ESS SYSTEM
UTILITY – AREA EPS

PCC

INTERCONNECTION
CUSTOMER – LOCAL EPS

OUTSIDE
INSIDE

Main Service Equipment
Generator Disconnection

FACILITY LOADS

UTILITY REVENUE METER

UTILITY REVENUE METER
MA SMART

See Note 9

DG Protection & Control

(charge & discharge)

Battery Storage

ESS System

REVENUE METERS ARE BI-DIRECTIONAL. NET METER AMR TYPE AND UTILITY OWNED. METER LOCATIONS DETERMINED BY UTILITY FOR AMR ACCESS REQUIREMENTS.

This diagram is representative of one proposal and the utility may require other configurations.
BTM >60 kW to 500 kW

This diagram is representative of one proposal and the Company may require other configurations.
BTM >60 kW to 500 kW

This diagram is representative of one proposal and the Company may require other configurations.
BTM >60 kW to 500 kW
BTM > 500 KW
This diagram is representative of one proposal and the utility may require other configurations.

REVENUE METERS ARE BI-DIRECTIONAL, NET METER AMR TYPE AND UTILITY OWNED.
METER LOCATIONS DETERMINED BY UTILITY FOR AMR ACCESS REQUIREMENTS.
RETAIL

Residential/Commercial DG Customer
Stand Alone MA SMART < 60 kW

With AC ESS SYSTEM
UTILITY – AREA EPS

INTERCONNECTION
CUSTOMER – LOCAL EPS

PCC

WH

UTILITY
REVENUE METER

Generator Disconnect
Main Service Equipment

DG Protection & Control

Battery AC Disconnect

Inverter
(charge & discharge)

Battery Storage

DG

REVENUE METERS ARE BI-DIRECTIONAL, NET METER AMR TYPE AND UTILITY OWNED.
METER LOCATIONS DETERMINED BY UTILITY FOR AMR ACCESS REQUIREMENTS.

ESS System

This diagram is representative of one proposal and the utility may require other configurations.
Stand Alone < 60 kW

This diagram is representative of one proposal and the utility may require other configurations.
Stand Alone > 60 kW to < 500 kW

This diagram is representative of one proposal and the Company may require other configurations.
Stand Alone > 60 kW to < 500 kW

This diagram is representative of one proposal and the Company may require other configurations.
Stand Alone > 60 kW to < 500 kW
Stand Alone > 60 kW to < 500 kW

AC ESS Battery + STGU Paired AC Connection to Utility EPS 60 to 500 kW

This diagram is representative of one proposal and the Company may require other configurations.
**Stand Alone > 500 kW**

This diagram is representative of one proposal and the Company may require other configurations.
Stand Alone > 500 kW
Contact Info

➢ Gerald (Jed) Ferris
➢ Smart Solar Program Manager
➢ National Grid
➢ 401 784-7364 Work
➢ 401 450-9417 Cell
➢ Gerald.Ferris@nationalgrid.com
➢ 245 South Main Street, Hopedale, MA.
➢ https://www.mass.gov/solar-massachusetts-renewable-target-smart
ISO-NE Asset Registration

Generators Defined in the Wholesale Market

ISO New England

Asset Registration and New Generation Coordination
FOREWORD

Getting From Interconnection To Wholesale Market Integration
Leg 1: Interconnection

- Non-FERC Jurisdictional
  - Local utility/State process
  - Interconnection studies
  - Two-party Interconnection Agreement
  - Wholesale market designation – TBD

- FERC Jurisdictional
  - ISO New England process
  - Interconnection studies
  - Three-party Interconnection Agreement
  - Wholesale market designation- Yes
Leg 2: Wholesale Market Integration

• Administered by ISO-NE
  – Energy (Day-Ahead, Real-Time; Locational Marginal Prices)
  – Day-Ahead and/or Real-Time Load Obligation
  – Day-Ahead and/or Real-Time Generation Obligation
  – Regulation (System clearing price)
  – Forward Capacity Market (Capacity Supply Obligation)
  – Forward Reserves (generation portfolio)
  – Black Start
  – Voltage and Reactive Control (VAR)

• Utility load (serving) obligation
  – Pool Resources
  – Request for Proposal (RFP)- load serving
  – Distributed Generation
SETTLEMENT ONLY GENERATOR (SOG)

Simplified Registration Process and Wholesale Market Integration
Settlement Only Generator

- ISO-NE Operating Procedure 14

- Asset Registration
  - Technical
    - Less than 5 MW and interconnecting below 115 kV
    - Aggregation rules (case-by-case review)

  - Market Participant (MP) Roles
    - Lead Market Participant- Asset
    - Lead Market Participant- Resource (Forward Capacity Market, if applicable)
    - Market Participant Owner (wholesale settlement obligation)

- Energy Market
MODELED/DEFINED GENERATOR

New generation process and Wholesale Market Integration
Modeled/Defined Generator

- Proposed Plan Application
- ISO-NE Operating Procedure 14
- ISO-NE Operating Procedure 18
- Asset Registration
  - Technical
    - Interconnecting at 115 kV or greater
    - 5 MW or greater interconnecting at any kV level
    - Aggregation rules (case-by-case review)
    - eMarket schedule (must run or economic)
  - Market Participant (MP) Roles
    - Lead Market Participant- Asset
    - Lead Market Participant- Resource (Forward Capacity Market, if applicable)
    - Market Participant Owner (wholesale settlement obligation)
    - Project developer or interconnecting (host) utility or existing MP
  - Energy Market, Forward Capacity Market, Regulation*, Forward Reserves*, Black Start*, VAR* (*as capable)

120 business days- Minimum
Modeled/Defined Generator (Continued)

- **New Generation Process**
  - Dispatch Location (24/7/365 operational awareness)
  - Power System Model (February/May/September)
  - ISO-NE system integration (settlement and dispatch)
  - Data models (As-Studied, As-Purchased, As-Built)
  - Additional Information
Modeled/Defined Generator (Continued)

Material Modification Risk

As-Studied data models

As-Built data models

As-Purchased data models

Dynamic Data Management System (DDMS)
What is ISO-NE OP14 and OP18?

• **ISO-NE Operating Procedure 14**
  – Technical Requirements
    • Reactive data
    • Transmission system data (as applicable)
    • Short Circuit data
    • Governor models
    • Protection systems
    • Other

• **ISO-NE Operating Procedure 18**
  – Remote Terminal Unit (RTU)
    • Directly Connected Front End- ISO-NE
      – Telemetry
      – Market data
      – Reliability data
APPENDIX: RESOURCES, DOCUMENTS, LINKS

Additional Information
Appendix: Resources, Documents, Links

Additional Information

New England’s Industry Structure

*NESCOE: New England States Committee on Electricity
**NECPUC: New England Conference of Public Utilities Commissioners
Appendix: Resources, Documents, Links

Additional Information

- Maintain minute-to-minute reliable operation of region’s generation and transmission system
- Objective- perform centralized economic dispatch of the bulk power system
- Coordinate and schedule maintenance outages
- Coordinate operations with neighboring power systems
Appendix: Resources, Documents, Links

Additional Information

• New Generation Project Summary and Checklist
  – http://www.iso-ne.com/participate/applications-status-changes/asset-registration

• New Generator Projects: Process Guide

• ISO-NE Transmission, Markets, and Services Tariff

• New Customer Registration (2-4 month process)

• ISO-NE Planning Procedures (PP05-0, PP05-1)
  – http://www.iso-ne.com/static-assets/documents/rules_proceds/isone_plan/pp05_0/pp5_0.pdf

• ISO-NE Manuals
  – http://www.iso-ne.com/participate/rules-procedures/manuals
Appendix: Resources, Documents, Links

Additional Information

• ISO-NE Operating Procedures (OP1, 12, 14, 16, 18, 23)
  – http://www.iso-ne.com/participate/rules-procedures/operating-procedures

• Generator Asset Registration
  – http://www.iso-ne.com/participate/applications-status-changes/asset-registration

• ISO-NE Training
  – http://www.iso-ne.com/participate/training
Appendix: Resources, Documents, Links

Additional Information

• ISO-NE Electronic Dispatch – Circuit and Router Order Form (if applicable)
  – Order at least 90+ days in advance of initial synchronization
  – Lead Market Participant coordinates with the ISO-NE New Generation Coordinator
  – Submit via Ask ISO – OR –
  – NewGenCoord@iso-ne.com

• Forward Capacity Market
  – http://www.iso-ne.com/markets-operations/markets/forward-capacity-market

• Transmission Service Applications (review with the interconnecting utility)
  – http://www.iso-ne.com/participate/applications-status-changes/transmission-service-applications

• Wind Integration Data Exchange Specification (Web services)
  – http://www.iso-ne.com/participate/support/user-guides
Appendix: Resources, Documents, Links

Additional Information

• **Voltage and Reactive Control data submittal (ISO-NE OP12)**
  – NX Application Training for NX12D Administrators

• **Transmission System data submittal (ISO-NE OP16)**
  – NX Application Training for NX9 Administrators

• **Generating Availability Data Systems (GADS)**
  – Information Submittal Requirements
    • [https://www.iso-ne.com/system-planning/resource-planning/gads-reporting](https://www.iso-ne.com/system-planning/resource-planning/gads-reporting)

• **Contact**
  – ISO-NE Asset Registration and Auditing (New Generation Coordinator)
    • [NewGenCoord@iso-ne.com](mailto:NewGenCoord@iso-ne.com)
  – ISO-NE Customer Support
    • [CustServ@iso-ne.com](mailto:CustServ@iso-ne.com)
    • 413-540-4220
    • Ask ISO (via the Standard Market Design portal)
For More Information

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Questions?